

<p style="text-align: center;">NATIONAL AERONAUTICS AND SPACE ADMINISTRATION RESEARCH AND TECHNOLOGY RESUME</p>
<p><b>TITLE</b></p> <p>Optical Investigation of Comet Halley</p>
<p><b>PERFORMING ORGANIZATION</b></p> <p>Department of Earth, Atmospheric and Planetary Sciences Massachusetts Institute of Technology Cambridge, MA 02139</p>
<p><b>INVESTIGATOR'S NAME</b></p> <p>David Jewitt</p>
<p><b>DESCRIPTION</b> (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)</p> <p>(a). <b>Strategy:</b> The physical properties of Comet P/Halley are being monitored from the ground using state of the art optical detectors. The long time base (1982 - present) of the observations provides a unique record of the development of activity in a single comet. In addition, physical properties of other comets are measured to provide a reference against which comet Halley may be compared.</p> <p>(b). <b>Accomplishments:</b> Results for the past year include</p> <p>(i). Publication of our first results on the surface brightness profiles of dust comets. The profiles yield information about the physical properties of the dust and about the influence of solar radiation pressure on the spatial dust distribution. A 3 - dimension Monte Carlo model was developed to interpret the measured profiles.</p> <p>(ii). CCD measurements of Comet Bowell show that the activity of comets can persist at least to heliocentric distances <math>R = 13.6</math> AU. This is clearly beyond the range of distances in which activity can be driven by water sublimation.</p> <p>(iii). A study of the back-scattering phase angle dependences of 5 comets (including Halley) shows evidence for small linear phase coefficients in each case. The phase curves of the comets differ from the phase curve of the Zodiacal Cloud.</p> <p>(iv). Temporal monitoring of P/Halley continues. The main finding is that an extensive coma persists in P/Halley at <math>R &gt; 6</math> AU.</p> <p>(c). <b>Future Work:</b></p> <p>(i). The Monte Carlo coma model will be modified to include a time dependent source function. This modification will make the model useful for the interpretation of comae which are not in steady state.</p> <p>(ii). Photometric monitoring of P/Halley will continue. The science objectives are to determine the full lightcurve and to determine the nucleus rotation state.</p>

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### **NASA Publications of David Jewitt (1987)**

- D. C. Jewitt and K. J. Meech (1987), "Surface Brightness Profiles of Ten Comets", *Astrophysical Journal*, **317**, 992.
- K. J. Meech and D. C. Jewitt (1987), "Comet Bowell at Record Heliocentric Distance", *Nature*, **328**, 506.
- K. J. Meech and D. C. Jewitt (1987), "Observations of Comet P/Halley at Minimum Phase Angle", *Astron. & Astrophys.*, **187**, 585 - 593.
- D. C. Jewitt and K. J. Meech (1988), "Optical Properties of Cometary Nuclei and a Preliminary Comparison with Asteroids", *Ap. J.*, **328**, 974 - 986.